trolled by the amount of stimulus, e.g., electrical current, applied to the surface, according to the user interface state of the surface. Any suitable shape changeable material can be used, including for example nitinol. The shape changeable material can be a single deformable membrane or it can for example work in cooperation with a deformable or flexible material (e.g., embedded or applied to a surface).

[0175] In some embodiments, the alterable regions of the surface **401** can be configured to form a matrix grid of rows and columns. It is to be understood, however, that the surface configuration is not so limited, but can include other suitable configurations. In some embodiments, a particular region of the surface **401** can change shape to form a discrete shape or form above the initial surface when the region is stimulated and can change shape to form a discrete shape or form below the initial surface when the region is stimulated.

[0176] FIG. **41** illustrates a side view of an exemplary user interface that can change topography using a shape changeable membrane to raise portions of the user interface surface according to embodiments of the invention. In the example of FIG. **41**, shape changeable regions **412**-*a* can be selectively stimulated to change shape to form a discrete arc above the initial surface **411**. The other regions of the surface **411** can remain unchanged in the initial surface when they are not stimulated.

[0177] FIG. **42** illustrates a side view of an exemplary user interface that can change topography using a shape changeable membrane to lower portions of the user interface surface according to embodiments of the invention. In the example of FIG. **42**, shape changeable regions **422**-*a* can be selectively stimulated to change shape to form a discrete hollow below the initial surface **421**, while the other regions of the surface can remain unchanged in the initial surface when they are not stimulated.

[0178] FIG. **43** illustrates an exemplary circuit for changing the user interface topography using a shape changeable membrane according to embodiments of the invention. The circuit **430** can include ASIC **437** that can be operatively coupled to PCB **436** that can be operatively coupled to the dynamic surfaces **401**, **411**, **421** of FIGS. **40** through **42**, respectively. In FIG. **43**, the PCB **436** and/or the ASIC **437** can cause a stimulus, e.g., an electrical current, to be applied to alterable regions of the surface **431**. The alterable regions can change shape when stimulated by the stimulus and can remain unchanged when not. The connections between the PCB **436** and/or ASIC **437** and the regions can include, for example, individual switches for each region, where a particular region's switch can close when the region is selected to be stimulated so as to transmit the stimulus and can remain open when not. Alternatively, the PCB **436** can be coupled to the surface via a flex circuit. Alternatively, the PCB **436** can be replaced with a flex circuit.

[0179] It should be appreciated that the user interface can have touch sensing capabilities. The sensing technology can be integrated with (e.g., embedded), applied to (e.g., attached) or be separate from the surface. In one example, capacitive sensing can be used. For example, the sensors can be embedded or applied to the inner surface of the user interface. In another example, proximity sensing can be used. For example, proximity sensors can be disposed underneath but decoupled from the user interface surface. Of course, other sensing technologies can also be used.

[0180] FIGS. **44** through **48** illustrate exemplary user interfaces that can change topography based on a location of a touch event according to embodiments of the invention. Rather than altering shape changeable nodes of a user interface prior to a user touching the user interface surface, the nodes can be altered dynamically as the user touches or near touches the surface at a certain user interface element, thereby informing the user of the location of the user interface element being or about to be touched. In the example of FIG. **44**, shape changeable nodes **442** of user interface **440** can be unaltered. In the example of FIG. **45**, finger **457** can touch a region or point of user interface surface **451**, thereby causing node **452**-*a*, associated with that region or point, to change the shape near the region or point. For example, the node can form a raised or recessed region or point proximate to the touch. The user therefore can know where the user is touching at any given moment during a touch event. In the example of FIG. **46**, as finger **467** moves to a different location (e.g., makes sliding, scrolling, tapping, or the like motion **456** of FIG. **45** to the right) on user interface surface **461**, node **462**-*a* proximate to the new location can change the shape of the surface and the previously touched node (such as node **452**-*a* of FIG. **45**) can change back to its original state. By way of example, if raised, node **452**-*a* can lower back to a nominal position and, if lowered, node **452**-*a* can raise back to the nominal position. In the example of FIG. **47**, as finger **477** moves to a different location (e.g., makes sliding, scrolling, tapping, or the like motion **466** of FIG. **46** downward) on user interface surface **471**, node **472**-*a* proximate to the new location can change the shape of the surface and the previously touched node (such as node **462**-*a* of FIG. **46**) can change back to its original state. By way of example, if raised, node **462**-*a* can lower back to a nominal position and, if lowered, node **462**-*a* can raise back to the nominal position. In the example of FIG. **48**, multi-touch can be implemented, where multiple fingers **487**-*a* and **487**-*b* touching respective nodes **482**-*a* and **482**-*b* can cause the nodes to change the shape of user interface surface **481** near each of the touches.

[0181] In one embodiment, the user interfaces shown in FIGS. **44** through **48** can be a single-touch or multi-touch screen display and can include a plurality of touch sensors grouped in rows and columns, for example, or some other appropriate configuration. The touch sensors can detect one or more touches or near touches on the user interface surface at one or more locations. The touch sensors can work as discrete sensors or together to form a larger sensor. Each touch sensor can raise, lower, or remain at an initial state, depending on the needs of the device. The touch display of the touch screen can also include a plurality of touch display nodes grouped in rows and columns, for example, or some other appropriate configuration. The display nodes can work as discrete displays or together to form a larger display (for example, a main display capable of distributing video or other applications). Each touch display node can operate as a shape changeable node by raising, lowering, or remaining at an initial state, individually, sequentially, collectively, or the like in order to change the user interface topography depending on the needs of the device.

[0182] In the examples of FIGS. **44** through **48**, the shape changeable nodes can be individual nodes that can be raised or lowered by underlying movable or deformable parts. A flexible membrane or a shape changeable membrane can also be used instead of the individual nodes. The nodes and membranes can be substantially transparent or semi transparent so as to see the underlying touch displays.